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THE REPRESENTATIVES OF *POTENTILLA ANSERINA* IN EASTERN AMERICA.

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BOTANISTS who have collected both in northern New England and on our seacoast have long realized that the Silverweeds of these two regions are far from identical; but, owing to the confusion which has prevailed in regard to the identity of the many described variations of the species, the question has been left until the plants could be treated by a monographer. In November, 1908, two extensive monographs of *Potentilla* appeared, but when one turns to these two treatments with the hope of settling his long-standing problems the results are certainly disheartening. Wolf,¹ following the conservative practice of many generations, maintains *Potentilla Anserina* as a *Potentilla* of world-wide distribution, of which he recognizes eight leading varieties and numerous forms. Rydberg,² on the other hand, treats the Silverweeds as a genus, *Argentina*, with eight North American species. It is, then, not surprising that the novice in this group finds himself perplexed to label with an approximation to truth the material in his herbarium.

After spending some days in the study of the material in the Gray Herbarium and the Herbarium of the New England Botanical Club, the writer finds that, as the plants appear to him, they fall into two definite and recognizable groups. These two pronounced tendencies, happily, are the same as those indicated by Wolf for the primary grouping of the varieties, and by Rydberg for the chief groups of his species; but, working independently, each author seems to have

¹ Theodor Wolf, Monographie der Gattung *Potentilla*, in *Bibliotheca Botanica*, xvi. pp. 1-714, Stuttgart (1908).

² Rydberg, *Rosaceae (pars)*, in *North American Flora*, xxii. pt. 4, pp. 293-376, New York Botanical Garden (1908).

overlooked an important character which is emphasized by the other. Wolf's key to the varieties of *Potentilla Anserina* is as follows.

- "I. Folia subtus plus minusve dense (raro parcissime) pilis longis adpressis tomentum verum obtegentibus argenteo-sericea, nitentia; sepala externa plerumque 3-plurifida, raro integra.
- A. Caules, petioli, rhaches foliorum pedunculique pilis *a c c u m b e n t i b u s* vel saltem valde *a r r e c t i s* vestiti, quandoque glabrescentes.
1. Folia subtus dense argenteo-sericea vel saltem albicantia aut cinerascantia.
 - a. Planta tota (praeter paginam inferiorem foliorum dense pilosam) modice vel parce pilosa, virescens vel subcanescenti-viridis. *v. vulgaris.*
 - b. Planta tota (etiam super paginam superiorem foliorum) dense argenteo-sericea, nitens *v. sericea.*
 2. Folia subtus viridia, sicut planta tota parce pilosa vel subglabra. *v. nuda.*
- B. Caules, petioli, rhaches foliorum pedunculique pilis *s u b h o r i z o n t a l i t e r p a t e n t i b u s* vestiti, hirsuti; foliola subtus adpresse sericeo-pilosi.
1. Foliola sessilia lineari-oblonga vel obovato-oblonga, basi longiuscule cuneata *v. hirsuta.*
 2. Foliola conspicue (terminale longe) petiolulata suborbiculata vel rotundato-obovata, basi contracta vel brevissime cuneata. *v. maoria.*
- II. Folia subtus aut glaberrima, aut tomento vero niveo obtecta, non nitentia vel super nervos pilis brevibus sericeis micantia (praevalente semper tomento opaco); sepala externa fere semper integerrima, rarissime 2-3 fida.
- A. Folia et sepala subtus tomentosa, reliquae plantae partes aut modice pilosae, aut subglabrae.
1. Planta robusta foliis maximis usque 30 cm. et ultra longis multijugis, foliolis superioribus 3-6 cm. longis; tomentum foliorum intermixtis pilis sericeis brevibus micans *v. grandis.*
 2. Planta mediocris vel parva foliis 3-6 (-10) cm. longis 3-5 (-7) jugis, foliolis superioribus 1-2 cm. longis, tomentum foliorum omnino opacum, ad summum quandoque secus nervos pilis sericeis paucis submicans *v. groenlandica.*
- B. Folia et sepala utrinque glaberrima, sicut plerumque reliquae quoque plantae partes. (Cfr. etiam *v. nudam.*) *v. Egedii.*"¹

Rydberg's division of *Argentina* is

¹ Wolf, l. c. 672.

“Achenes corky with a deep groove; stems, petioles, and rachis of the leaves densely pubescent, with at first ascending and later spreading hairs.

Leaves silvery on both sides. 1. *A. argentea*.

Leaves green and glabrate above. 2. *A. Anserina*.

Achenes not corky, without a groove; stem, petioles, and the rachis of the leaves glabrous or slightly appressed-hairy and glabrate.

Petals usually over 1 cm. long, rounded-obovate.

Bractlets lanceolate, longer than the sepals; leaves usually 3–4 dm. long. 3. *A. pacifica*.

Bractlets elliptic or oblong, shorter than the sepals; leaves 1–2 dm. long. 4. *A. occidentalis*.

Petals 6–8 mm., rarely 1 cm. long, usually elliptic-obovate.

Leaflets elliptic-obovate to oblanceolate, many-toothed, silky as well as tomentose beneath; bractlets nearly equaling the sepals or even exceeding them.

Upper leaflets rounded at the apex, with more than 20 linear-lanceolate teeth; petals elliptic, about 6 mm. long; pistils few. 5. *A. Babcockiana*.

Upper leaflets acute or obtuse at the apex, with less than 20 triangular-lanceolate or ovate-lanceolate teeth.

Hypanthium acute at the base; bractlets linear-lanceolate; rachis of the leaves appressed-pubescent. (Western species.) 6. *A. subarctica*.

Hypanthium obtuse at the base; bractlets broadly lanceolate; rachis of the leaves glabrate or nearly so. (Eastern species.) 7. *A. litoralis*.

Leaflets broadly obovate, 0.5–1 cm. long, few-toothed, usually tomentulose beneath but silky only on the veins; bractlets linear or lanceolate, much shorter than the sepals. 8. *A. Egedii*.¹

As stated, the writer finds in studying the American material that the characters of the two leading groups in these two treatments are very constant. The achene-characters described by Rydberg are beautifully clear in all the fruiting material examined, and, associated as they are with the peculiarity of pubescence brought out more definitely in Wolf's descriptions of his primary groups, indicate that the plants of the two groups are scarcely to be considered varieties of one species. This view is further strengthened by the fact that the varieties of Wolf's first group are all Old World or circumpolar plants, while those of the second group are essentially confined to North America and adjacent eastern Asia.

Potentilla Anserina (including var. *vulgaris*), the circumpolar

¹ Rydb. l. c. 352, 353.

species, has the achenes corky and plump, with a groove in the back so that the achene appears slightly 2-ridged; its peduncles, stolons, and rhachises are usually very pubescent; the young foliage is lustrous beneath; and the bractlets of the calyx, though sometimes entire, are commonly toothed or lobed. This plant is abundant on gravelly shores of the Gulf of St. Lawrence, of the St. John River and its tributaries in Maine and New Brunswick, of Lake Champlain, and of many rivers and lakes of the interior; and it follows at low levels along the mountains from Alaska to New Mexico and southern California. It is also occasionally introduced southward on ballast and transported gravel.

The writer has sought in vain for constant characters to separate Rydberg's *Argentina argentea* from his *A. Anserina*. The key-character given by Dr. Rydberg is that the former has the "leaves silvery on both sides," the latter the "leaves green and glabrate above." Careful scrutiny of the diagnoses which describe the characters in one plant but fail to bring out their contrasts with parallel characters of the other,¹ shows no difference (except the pubescence) which might not

¹ *A. argentea*

"Stolons 1-5 dm. long, white-silky with ascending or spreading hairs."

"Basal leaves 1-2 dm. long, pinnate, with 11-25 larger leaflets and smaller ones interposed; rachis with long white, at first ascending, soon spreading hairs."

"Larger leaflets 1-3 cm. long, obovate, rounded at the apex, serrate with 7-20 ovate or ovate-lanceolate teeth, white-silky on both sides or a little greener above, the smaller ones less than 1 cm. long and few-toothed."

"Pedicels 2-7 cm. long, white-silky."

"Hypanthium and calyx white-silky, the former 5-8 mm. wide."

"Bractlets oblong or elliptic, 4-6 mm. long, usually entire, about equaling the ovate or ovate-lanceolate sepals."

"Petals obovate or broadly oval, 6-9 mm. long."

"Achenes 2 mm. long, brown, obliquely obovate, corky, with a deep groove."

A. Anserina.

"Main stem almost none, from a cluster of fascicled roots and producing numerous runners 3-6 dm. long."

"Leaves 1-2 dm. long, interruptedly pinnate, with 9-31 larger leaflets and smaller interposed, in the typical form spreading or flat on the ground, slightly silky and green above, white-silky and tomentose beneath."

"Larger leaflets 1-4 cm. long, oblong or oblanceolate, usually acute, deeply and sharply serrate with linear-lanceolate teeth in the European and eastern American form, more obovate, rounded at the apex and with broader ovate or triangular teeth in the Rocky Mountain form."

"Flowers 1-2 cm. in diameter, on pedicels 3-10 cm. long."

"Bractlets simple and lanceolate, or often broader, ovate-lanceolate, toothed or divided, generally a little longer than the broadly ovate sepals."

"Petals oval, 7-10 mm. long."

"Achenes numerous, corky, very thick, grooved at the upper end."

be expected from a single package of seed planted in different corners of a garden. The leaflets of *A. argentea* are said to be obovate, while those of *A. Anserina* are described as oblong, oblanceolate, or obovate. A sheet of the St. John Valley plant with the leaflets conspicuously silvery-silky above and labeled by its collector *Potentilla Anserina*, var. *concolor* is in the Gray Herbarium, but in spite of its leaves being "silvery on both sides" it was relabeled by Dr. Rydberg in 1908 "*Argentina Anserina* (L.) Rydb." Other specimens in the Gray Herbarium marked by Dr. Rydberg as his *A. argentea* have the leaflets of the most typical oblong outline. As to the persistence of the silvery-sericeous pubescence on the upper surfaces of the leaflets, this ecological character is very marked in extreme plants, but in other less pronounced colonies some of the leaves are sericeous above, while others are quite green and glabrous. Such a specimen in the Gray Herbarium collected by Engelmann on the Laramie River shows this inconstancy of the pubescence; nevertheless it was marked without question by Dr. Rydberg as "var. *concolor*" (prior to his raising that variety to specific rank as *A. argentea*). At best, then, *A. argentea* is to be treated as an ecological variant of *Potentilla Anserina*, characterized by the silvery-sericeous pubescence which normally covers both sides of the leaves. This rather pronounced extreme of *P. Anserina* has long been called var. *concolor* Seringe,¹ although the name was earlier assigned to it by Wallroth;² but Wolf draws attention to the fact that, prior to the publication of var. *concolor* by Wallroth, the plant had been described by Hayne as *P. Anserina*, "*β. sericea foliis utrinque sericeis.*"³ The plant, then, which is abundant in the Northwest and extends in less pronounced form eastward to the St. John River, Maine, and the Gulf of St. Lawrence, should be called *Potentilla Anserina*, var. *sericea* Hayne.

Of the other plants designated by Wolf under his first division none (except var. *vulgaris* which is typical *P. Anserina*) is known in America. Var. *nuda* seems to be strictly European; var. *hirsuta* is known only from Asia; and var. *maoria* (*P. anserinoides* Raoul; *P. Anserina*, var. *anserinoides* Hook. f.), which has stronger claims to specific rank than are recognized by Wolf,⁴ is a unique plant of the New Zealand region.

¹ Ser. in DC. Prodr. ii. 582 (1825).

² Wallr. Sched. Crit. i. 236 (1822).

³ Hayne, Arzneigew, iv. 31 (1816) according to Wolf, l. c. 672, 673.

⁴ *P. anserinoides* Raoul, besides having petiolulate leaflets, differs from *P. Anserina* in its comparatively thin laterally compressed achenes which are not dorsally grooved.

Of the plants enumerated by Wolf and by Rydberg under their second main groups, *Potentilla Egedii* Wormsk. (*P. Anserina*, var. *Egedii* T. & G., *Argentina Egedii* Rydb.) seems to stand off from the others by the pinnate (scarcely interruptedly pinnate) leaves, and the few comparatively broad leaflets which are glabrous or glabrate beneath. The writer has been unable to see good achenes of this plant, but they are said by Rydberg to be "2.5 mm. long, plump, not grooved." *P. Egedii* is an arctic plant seemingly distinct from *P. Anserina* and extending down our coast to northern Labrador.

The other species maintained by Rydberg are open to greater doubt. In the first place, the chief distinction of his species nos. 3 and 4 as contrasted with the remainder is, that in the first two species the petals are "usually over 1 cm. long, rounded-obovate"; while in the others the petals are said to be "6-8 mm., rarely 1 cm. long, usually elliptic-obovate." Under the group with petals "over 1 cm. long" are *Argentina pacifica* and *A. occidentalis*, which in the seventeen sheets at hand show petals varying from 1-1.3 cm. long, with outlines from elliptic-oblong to broadly obovate. In the eastern plant called *A. litoralis* the fifteen sheets before the writer show elliptic to obovate petals 1-1.3 cm. long; not one of them less than 1. cm. in length. This is the common salt marsh plant of New England and eastern Canada, and one cannot refrain from expressing regret that Dr. Rydberg has never known the full beauty of its large flowers. This fundamental distinction of size of petals is, then, a character which is not shown by abundant specimens. Whether *A. occidentalis* is separable from *A. pacifica* is not one of the chief questions of this paper, but it is worth recording that the specimen of Baker's no. 3217 (the type number of *A. occidentalis*) in the Gray Herbarium is unlike the description given by Rydberg in having lanceolate bractlets which are quite as long as the sepals, thus answering more nearly the key character of *A. pacifica*.

Of *Argentina Babcockiana*, described from Westminster Park and from the shores of Oneida Lake, New York, the writer has no knowledge; but with *A. litoralis*, the common species "along the coast and in salt marshes, from Labrador, Newfoundland, and Quebec to Long Island," he has long been familiar. This salt marsh plant is clearly distinct from *Potentilla Anserina* of the gravel beaches of the St. Lawrence, the St. John, and Lake Champlain, in the dull white tomentum of its leaves; the glabrous or early glabrate peduncles, stolons, and

rhachises; and the laterally compressed round-backed, not furrowed, achenes. That it merits specific recognition there can be no question, but prolonged study has failed to show that it differs in constant or even apparent characters from *Potentilla pacifica* Howell¹ (*P. Anserina*, var. *grandis* T. & G., *Argentina pacifica* Rydberg). In all essential characters — pubescence, bractlets, petals, achenes, etc., — the plant of the Atlantic salt marshes is like that of the Pacific coast, though Rydberg's descriptions make it differ in its smaller flowers (see above) and its more obovate or oval leaflets. In the outline of the leaflets *P. pacifica* shows considerable variation, and many of the northwestern specimens cannot be distinguished by this character from the plant of the Atlantic coast. There seems to be no reason, then, why the two plants should be kept apart by the artificial character set up for them. It is interesting to find, as our knowledge of temperate floras should lead us to expect, that *P. pacifica* extends by way of the Aleutian Islands to the coast of eastern Asia and south to Japan,² a fact already brought out by Wolf, who, although overlooking the important achene-character of the plant and therefore treating it as *P. Anserina*, var. *grandis*, states its range as the Pacific and Atlantic coasts of America and the east coast of Asia.³

As *Potentilla pacifica* approaches the northern limit of its range it becomes dwarfed and its leaflets are rapidly reduced in number until, in northern Labrador, Greenland, arctic Alaska, and northeastern Siberia, it often has only 7–15 small leaflets. This dwarfed arctic and subarctic extreme is *P. Anserina*, var. *groenlandica* Tratt., but, so far as the material at hand shows, it is to be considered a dwarfed phase of *P. pacifica* rather than a true variety. On the coast of New England and eastern Canada, Dr. Rydberg's *P. litoralis*, which is said to have the "leaves 1–3 dm. long," with the "upper leaflet 2–3 cm. long," becomes dwarfed under adverse conditions and has leaves barely 3 cm. long, with as few as 13 leaflets, the terminal 7 mm. long,

¹ Howell, Fl. N. W. Am. i. 179 (1898).

² These plants which occur in Eastern North America and in northeastern Asia but not in Europe make a considerable portion of our flora — one hundred or more species; *Onoclea sensibilis*, *Cypripedium arietinum*, *Habenaria bracteata*, *Polygonum arifolium*, *P. sagittatum* and *P. scandens*, *Geum strictum*, *Phryma Leptostachya*, &c. Several such plants are associated in salt marshes or brackish soil on both the Atlantic and Pacific coasts with *Potentilla pacifica*; for example, *Poa eminens*, *Glaux maritima*, var. *obtusifolia*, and *Gentiana Amarella*, var. *acuta*.

³ See Wolf, l. c. 676.

while luxuriant plants have leaves 4.3 dm. long, the terminal leaflet 5.5 cm. in length. *Argentina subarctica* Rydberg, judging from specimens in the Gray Herbarium named by Dr. Rydberg, is transitional between well developed *Potentilla pacifica* and its most dwarfed state.

As interpreted by the writer the members of this group in eastern America should be classified as follows.

* Achene thick-ovoid to subglobose, more or less corky, dorsally sulcate: stolons, peduncles, petioles, and rhachises more or less pubescent with ascending or loosely spreading hairs: leaflets silvery-silky beneath, at least the younger lustrous.

P. ANSERINA L. Leaflets green and glabrous or glabrate above: bractlets often cleft.—Sp. 495 (1753). *P. Argentina* Huds. Fl. Ang. 195 (1762). *Argentina vulgaris* Lam. Fl. Fr. iii. 119 (1778). *P. Anserina a vulgaris* Hayne, Arzneigew. iv. 31 (1816) according to Wolf, Mon. Pot. 672 (1908). *P. Anserina a discolor* Wallr. Sched. Crit. i. 236 (1822). *Argentina Anserina* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 159 (1898).—Widely distributed in northern regions. In America extending south, chiefly in gravelly or sandy soil, to Prince Edward Island, the St. John Valley of New Brunswick and Maine, Lake Champlain, western New York, northern Indiana, central Illinois, Iowa, New Mexico, and southern California.

Var. *SERICEA* Hayne. Leaflets silvery-sericeous on both surfaces.—Arzneigew. iv. 31 (1816) according to Wolf, Mon. Pot. 672, 673 (1908). *P. Anserina β. concolor* Wallr. Sched. Crit. i. 236 (1822). *P. Anserina β. holosericea* Gaudin, Fl. Helvet. iii. 406 (1828). *P. Anserina, a argentea* Neilr. Fl. N. Österr. 908 (1859). *P. Anserina a. unicolor* Schur, En. pl. Transs. 189 (1866). *P. sericea* Zimmeter, Eur. Art Pot. 6 (1884), acc. to Wolf. *P. concolor* Zimmeter, Bot. Kal. 66 (1887) acc. to Wolf. *Argentina Anserina concolor* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 160 (1898). *A. argentea* Rydb. Bull. Torr. Bot. Cl. xx. iii. 143 (1906).—Of similar distribution; in the eastern states and Canada often growing with or near the typical form of the species; in the more arid regions of North America generally with thickish leaves.

* * Achene laterally compressed, firm, rounded on the back, not sulcate: stolons, peduncles, petioles, and rhachises glabrous or glabrate: leaflets white-tomentose beneath with opaque hairs (slightly if at all sericeous) or glabrate.

† Calyx and lower surfaces of the interruptedly pinnate leaves white-tomentose.

P. PACIFICA Howell. Leaves 0.3–5 dm. long, with 7–31 oblong, oblanceolate, or obovate leaflets: bractlets usually simple.—Fl. N. W. Am. i. 179 (1898). *P. Anserina groenlandica* Tratt. Ros. Monog.

iv. 13 (1824). *P. Anserina*, β . *grandis* T. & G. Fl. i. 444 (1840). *Argentina Egedii* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 158 (1898) in part. *A. Anserina grandis* Rydb. l. c. 161 (1898). *A. pacifica* Rydb. in N. A. Fl. xxii pt. 4, 353 (1908). *A. litoralis* Rydb. l. c. 354 (1908). *A. subarctica* Rydb. l. c. 354 (1908).—From Greenland to northeastern Siberia, extending southward, in damp brackish or saline soils, chiefly near the coast to Long Island, New York, California, and Japan; in arctic and subarctic situations and in unfavorable conditions southward becoming very small.

+ + Calyx and lower surfaces of the simply pinnate leaves glabrous or glabrate.

P. EGEDII Wormsk. Fl. Dan. ix. fasc. 27, 5. t. 1578 (188). *P. Anserina*, δ *Egedii* T. & G. Fl. i. 444 (1840). *P. Anserina*, var. *concolor* Lange, Consp. Fl. Groenl. 234 (1887) not Wallr. *Argentina Egedii* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 158 (1898) in part.—Arctic regions, extending south on our coast to northern Labrador.

GRAY HERBARIUM.

SALIX SUBSERICEA A DISTINCT SPECIES.

F. F. FORBES.

FOR the past two seasons the writer has been much puzzled by a willow the characters of which do not agree with any description given in the current manuals. This willow is rather common in the vicinity of Boston, growing in wet places where willows usually thrive. The writer has collected it in different locations in Dedham, West Roxbury, and Arlington. Leaf-specimens collected in western Massachusetts and in southern New York indicate that it has quite a wide range.

It was at first suspected that the willow in question might be a hybrid between *Salix cordata* Muhl. and *S. sericea* Marsh., but study of numerous specimens from many different shrubs shows that it cannot be a hybrid. As far as the writer's observations go, willows which are hybrids between two definite species do not present constant characters. One shrub may have the fruit more like that of one parent and the leaves more like those of the other; or the shrubs may be quite intermediate in most respects; but no two of them are alike.